Candidate 1 – Refraction

Marks Awarded and Commentary

Section	Expected Response	Maximum mark	Mark awarded	Commentary
1. Aim	An aim that clearly describes the purpose of the investigation.	1	1	The candidate's aim clearly described the purpose of the investigation.
2. Underlying Physics	An account of the physics relevant to the aim.	3	2	The candidate has shown a reasonable understanding of the physics relevant to the aim, showing an awareness that refraction occurs on a change of density of medium and that a change of speed may cause a change of direction. The candidate has not commented on the effects of wavelength or frequency in refraction or what is meant by density in this context. In addition, there is no explanation of how a change in wave speed results in a change in direction, and the candidate has not drawn a diagram demonstrating the correct placing of the angles of incidence and refraction. A more complete explanation of the underlying physics than that given may be beyond National 5 level, and so an alternative topic or aim may have been more appropriate for the candidate.
3a. Brief description	A brief description of the approach used to collect experimental data.	1	1	The candidate's description of their experiment is given in sufficient detail for the marker to be able to visualise the nature of the experiment.
3b. Sufficient raw data	Sufficient raw data from the candidate's experiment.	1	1	The candidate has made repeated measurements and has an acceptable range for the independent variable.

Section	Expected Response	Maximum mark	Mark awarded	Commentary
3c. Data table	Data from the candidate's experiment is presented in a suitable table.	1	1	Each column in the candidate's table has clear headings and units of measurement.
3d. Mean/ derived values	Mean and/or derived values are calculated correctly.	1	1	The candidate's repeated measurements of the angle of incidence showed no variations and so the calculation of a mean is unnecessary. The calculations of the mean value of the angle of refraction, however, are correct.
3e. Internet/ literature data	Data relevant to the experiment from an internet/ literature source.	1	1	The internet data that the candidate has included is relevant to the candidate's experiment.
3f. Reference	A reference for the source of the internet/ literature data.	1	1	The candidate has given a full URL for the website page containing the data given in the report.
4a. Appropriate format	A graph of the appropriate format.	1	1	The candidate has drawn a scatter graph, which is an appropriate format for the experimental data.
4b. Suitable scales	The axes have suitable scales.	1	1	The candidate has used suitable linear scales for both axes of the graph.
4c. Suitable labels and units	The axes have suitable labels and units.	1	0	The candidate has labelled the axes of the graph with appropriate units, but the labelling of the quantities being graphed is missing.
4d. Accurately plotted data points	Accurately plotted data points and, where appropriate, a line of best fit.	1	0	The candidate has plotted the data points to an acceptable accuracy, but the line of best fit drawn by the candidate is not appropriate for the data. From the scatter of the plotted points, a curve would have been appropriate.

Section	Expected Response	Maximum mark	Mark awarded	Commentary
5. Analysis	A valid comparison of the experimental data with data from the internet/ literature.	1	1	The candidate has stated *'The experimenter was using acrylic and not glass but the graphs are the same.'* which is acceptable as a comparison of the experimental and internet data.
6. Conclusion	A valid conclusion that relates to the aim and is supported by data.	1	0	The candidate has not made a statement describing their conclusion.
7. Evaluation	An evaluation of the experimental procedure.	2	1	The candidate has identified the '*nearest half* degree' issue as a factor which could have a significant effect, but the explanation of using a digital protractor confuses *accuracy* and *precision*, and so the second mark is not awarded.
8a. Title	The report has an informative title.	1	0	The candidate has not included an informative title.
8b. Structure	A clear and concise report.	1	1	The candidate's report is clear and concise.
TOTAL		20	14	

Candidate 2 – Ohm's Law

Marks Awarded and Commentary

Section	Expected Response	Maximum mark	Mark awarded	Commentary
1. Aim	An aim that clearly describes the purpose of the investigation.	1	1	The candidate's aim describes clearly the purpose of the investigation.
2. Underlying Physics	An account of the physics relevant to the aim.	3	1	The candidate has shown a limited understanding of the physics relevant to the aim at a depth appropriate to National 5. The symbols used in the relationship '*V=IR*' are not defined and the concept of electrical resistance is not explored.
3a. Brief description	A brief description of the approach used to collect experimental data.	1	1	The candidate's description of their experiment is given in sufficient detail for the marker to be able to visualise the nature of the experiment.
3b. Sufficient raw data	Sufficient raw data from the candidate's experiment.	1	1	The candidate has given an acceptable number and range of values. The candidate has not given repeats, but has explained that there was a lack of significant variation in repeated values, which is acceptable.
3c. Data table	Data from the candidate's experiment is presented in a suitable table.	1	0	The candidate has presented their data in a table with correct headings. The candidate has not, however, included units for voltage so the mark for this section is not awarded.

Section	Expected Response	Maximum mark	Mark awarded	Commentary
3d. Mean/ derived values	Mean and/or derived values are calculated correctly.	1	0	The candidate has not calculated any mean or derived values.
3e. Internet/ literature data	Data relevant to the experiment from an internet/ literature source.	1	1	The internet data that the candidate has included is relevant to their experiment.
3f. Reference	A reference for the source of the internet/ literature data.	1	1	The candidate has given a full URL for the website page containing the data given in the report.
4a. Appropriate format	A graph of the appropriate format.	1	1	The candidate has produced a computer-generated scatter graph. This is an appropriate format for this data.
4b. Suitable scales	The axes have suitable scales.	1	1	The axes of the candidate's graph have suitable linear scales.
4c. Suitable labels and units	The axes have suitable labels and units.	1	1	The axes of the graph have suitable labels and units.
4d. Accurately plotted data points	Accurately plotted data points and, where appropriate, a line of best fit.	1	1	The candidate has used an electronic graphing package, and has given accurately plotted data points and an acceptable line of best fit.
5. Analysis	A valid comparison of the experimental data with data from the internet/ literature.	1	1	The candidate's statement '*The graph from the BBC revision website is a straight line just like my graph.*' is a valid comparison between the experimental data and the data from the internet source.

Section	Expected Response	Maximum mark	Mark awarded	Commentary
6. Conclusion	A valid conclusion that relates to the aim and is supported by data.	1	1	Although not explicitly stating the Ohm's law proportionality relationship between V and *I,* the candidate's statement '*The graph from the website and my graph are both straight lines that pass through the origin. The data in my report verifies Ohm's law'* is an acceptable conclusion that relates to the aim and is supported by the data in the report.
7. Evaluation	An evaluation of the experimental procedure.	2	2	The candidate has identified the temperature of the wire as a potential factor which may have had a significant effect on the accuracy of the experiment, and has explained what was done to minimise this factor.
8a. Title	The report has an informative title.	1	1	The candidate has included an informative title.
8b. Structure	A clear and concise report.	1	1	The candidate's report is clear and concise.
TOTAL		20	16	

Candidate 3 – Stopping Distance

Marks Awarded and Commentary

Section	Expected Response	Maximum mark	Mark awarded	Commentary
1. Aim	An aim that clearly describes the purpose of the investigation.	1	1	The candidate's aim clearly described the purpose of the investigation.
2. Underlying Physics	An account of the physics relevant to the aim.	3	0	The candidate's account of the relevant physics shows no understanding at a depth appropriate to National 5.
3a. Brief description	A brief description of the approach used to collect experimental data.	1	1	The candidate's description of their experiment is given in sufficient detail for the marker to be able to visualise the nature of the experiment.
3b. Sufficient raw data	Sufficient raw data from the candidate's experiment.	1	0	The candidate has given an acceptable number of values with an appropriate range. In this investigation, however, it would be appropriate to include repeated measurements, but the candidate has not done so and so the mark for this section is not awarded.
3c. Data table	Data from the candidate's experiment is presented in a suitable table.	1	0	The candidate has shown the experimental data in a table with correct headings. The candidate has not, however, included units of measurement and so the mark for this section is not awarded.

Section	Expected Response	Maximum mark	Mark awarded	Commentary
3d. Mean/ derived values	Mean and/or derived values are calculated correctly.	1	0	The candidate has not calculated mean or derived values and so the mark for this section is not awarded.
3e. Internet/ literature data	Data relevant to the experiment from an internet/ literature source.	1	1	The internet data that the candidate has included is relevant to the candidate's experiment.
3f. Reference	A reference for the source of the internet/ literature data.	1	1	The candidate has given a full URL for the website page containing the data given in the report.
4a. Appropriate format	A graph of the appropriate format.	1	1	The candidate has produced a computer-generated scatter graph, which is an appropriate format for their data.
4b. Suitable scales	The axes have suitable scales.	1	1	The axes of the candidate's graph have suitable linear scales.
4c. Suitable labels and units.	The axes have suitable labels and units.	1	0	The candidate has not stated units in the table and was not awarded the mark for 3c. The candidate is not penalised again for missing *units* in the graph but the graph produced has no *labels* on the axis. The mark for this section is not awarded.
4d. Accurately plotted data points	Accurately plotted data points and, where appropriate, a line of best fit.	1	0	The candidate's data points are excessively large and minor gridlines omitted, making it difficult to check the accuracy of plotting. In addition, there is no line of best fit drawn. The mark for this section is not awarded.
5. Analysis	A valid comparison of the experimental data with data from the internet/ literature.	1	1	The candidate's statement *'This is the same pattern as the results of the experiment'* is a valid comparison between their experimental data and the data from the internet source.

Section	Expected Response	Maximum mark	Mark awarded	Commentary
6. Conclusion	A valid conclusion that relates to the aim and is supported by data.	1	1	The candidate has made a conclusion that relates to the aim and is supported by the data in the report.
7. Evaluation	An evaluation of the experimental procedure.	2	0	Although making a suggestion of how the investigation may have been improved, the candidate has not identified a **factor** which had a significant effect on the experiment. Had the candidate identified the random nature of the measurements as a factor and explained how repeated measurements and calculating an average could have addressed this factor, credit would be given.
8a. Title	The report has an informative title.	1	0	The candidate has not included an informative title.
8b. Structure	A clear and concise report.	1	1	The candidate's report is clear and concise.
TOTAL		20	9	